



Structure of the lithosphere-asthenosphere system in the vicinity of the Tristan da Cunha hot spot as seen by surface waves

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According to classical plume theory, the Tristan da Cunha hotspot is thought to have played a major role in the rifting of the South Atlantic margins and the creation of the aseismic Walvis Ridge by impinging at the base of the continental lithosphere shortly before or during the breakup of the South Atlantic margins. However, Tristan da Cunha is enigmatic as it cannot be clearly identified as a hot spot but may also be classified as a more shallow type of anomaly that may actually have been caused by the opening of the South Atlantic. The equivocal character of Tristan da Cunha is largely due to a lack of geophysical and petrological data in this region.

We therefore staged a multi-disciplinary geophysical study of the region by acquiring passive marine electromagnetic and seismic data, and bathymetric data within the framework of the SPP1375 South Atlantic Margin Processes and Links with onshore Evolution (SAMPLE) funded by the German Science foundation. The experiment included two ship expeditions onboard the German R/V MARIA S. MERIAN in 2012 and 2013.

In our contribution we will present first results on the shear wave velocity structure of the lithosphere-asthenosphere system. We applied the classical two-station method; Rayleigh wave dispersion curves are determined by cross-correlation of seismograms from a pair of station. We measured interstation phase velocities of (earthquake-excited) fundamental-mode surface waves in a period range of 10 to 60 s. The selection of acceptable phase-velocity measurements in the frequency domain had to be done manually for each event. We present phase-velocity maps for the study area. Furthermore, we present 1D shear wave velocity models inverted from the highest-quality observations.